Class 9 CBSE Test paper Solved Chapter 3: Structure of atoms -1

1. Q. Write the charge and mass of an electron.

Ans:

Particle	Symbol	Charge	Mass
Electron	e⁻	-1.60×10^{-19} C	9.1×10^{-31} kg

2. Q. List three subatomic particles of an atom. Compare them on the basis of relative mass and charge in a tabular form.

Ans:

Particle	Symbol	Charge	Mass
Electron	e⁻	-1.60×10^{-19} C	9.1×10^{-31} kg
Proton	p⁺ (H⁺)	1.60×10^{-19} C	1.672×10^{-27} kg
Neutron	n⁰	0.00 C	1.674×10^{-27} kg

3. Q. Find the number of electrons, protons and neutron possessed by the alpha particles $_2^4He^{+2}$ used in the gold leaf experiment.

Ans: The number of electrons, protons and neutron are 0,2,2
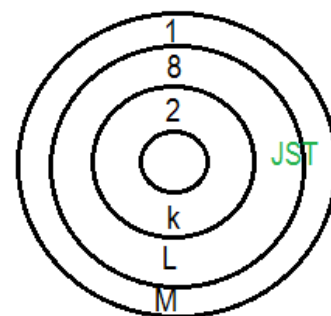
4. Q. Draw Bohr's model for an atom with

(i) valency = 1,   (ii) number of orbits = 3   (iii) mass number =23.

Also identify the element. What conclusion can be drawn about the reactivity of the element?

Ans: Sodium has 11 protons and 12 neutrons.

So, The mass number is 11 + 12 = 23.

This element is metal and highly reactive

5. Q. (a) You are given an element. Find out $_7^{14}X$

(i) Number of protons, electrons and neutrons in 'X'.   (ii) Valency of 'X'.

(iii) Electronic Configuration of 'X'.

(b) If bromine atom is available in the form of, say two isotopes $_{35}^{79}Br$ (49.7%) and $_{35}^{81}Br$ (50.3%). Calculate the average atomic mass of bromine atom.

Ans: (i) Number of protons, electrons and neutrons in 'X'. are 7, 7 and 7 respectively

(ii) Valency of 'X'. is = 3 [NH₃]

(iii) Electronic Configuration of 'X'. = 2, 5

(b) The average atomic mass of bromine atom = $\frac{79 \times 49.7}{100} + \frac{81 \times 50.3}{100}$ = 80u

6. Q. (a) From Rutherford's α - particle scattering experiment give the experimental evidence for deriving the conclusion that

(i) Most of the space inside the atom is empty.

(ii) Whole mass of an atom is concentrated in its centre.

(iii) The nucleus of an atom is positively charged.

(b) An element has mass number 31 and atomic number 15 find :

(i) the number of neutrons in the element, and

(ii) the number of electrons in the outermost shell.

Ans: (a) (i) Most of the alpha particles passed through gold foil with getting deflected.

(ii) Very few particles were deflected from their path by 180⁰ indicating that whole mass of the atom is present in its centre.

(iii) Few particles deflected at small and large angle from their path indicating that centre is positively charged

(b) (i) the number of neutrons in the element = 31-15 = 16

(ii) Electronic configuration 2,8,5 then the number of electrons in the outermost shell. = 5

7. Q. Give reasons:

(a) Mass number of an atom excludes the mass of an electron.

(b) Nucleus of an atom is charged.

(c) Alpha particle scattering experiment was possible by using gold foil only and not by foil of any other metal.

Ans: (a) Mass number is the sum of the number of proton and neutron present in nucleus of atom therefore Mass number of an atom excludes the mass of an electron.

(b) Nucleus of an atom is charged as they contain positively charged proton.

(c) This is because because gold has high malleability and can be hammered easily into thin sheet. `

8. Q. Laws of conservation of mass is not fully applicable for:

(a)Precipitation reaction   (b) Redox reaction

(c) Nuclear reaction   (d) Displacement reaction

9. Q. (a) Define the following terms with one example each. (i) Isotope (ii) Isobar

(b) Name the elements whose isotopes are used in:

(i) Nuclear Reactor (ii) treatment of cancer. (iii) Treatment of cancer

Ans:(a) Isotopes are defined as the atoms of the same element, having the same atomic number but different mass numbers.

For example, hydrogen atom, it has three atomic species, namely Protium, deuterium and tritium. The atomic number of each one is 1, but the mass number is 1, 2 and 3, respectively.

Other such examples are carbon, C_{12}, C_{14} and C_{16} where as chlorine, C_{35} and Cl_{37}

Isobars.: Atoms of different elements with different atomic numbers, which have the same mass number, are known as isobars. For example calcium, atomic number 20, and argon, atomic number 18 but the mass number of both these elements is 40.

(b) (i)An isotope of uranium is used as a fuel in nuclear reactors.

(ii) An isotope of cobalt is used in the treatment of cancer.

(iii) An isotope of iodine is used in the treatment of goitre.

10.Q. (a) How many electrons are present in the valence shell of nitrogen, oxygen and argon ?

(b) Nucleus of an atom has 5 protons and 6 neutrons. What is the atomic number, mass number and electronic configuration of the atom?

Ans: (a) 5, 6 8 electrons are present in the valence shell of nitrogen, oxygen and argon respectively.

(b) Nucleus of an atom has 5 protons and 6 neutrons.

The atomic number = no of proton = 5, mass number = p + n = 5 + 6 = 11

This represents the element Boron

Electronic configuration of the atom of Boron = 2,3

11.Q. State the problem of atomic structure which was solved after the discovery of neutron.

Ans: when the neutron was not discovered, many scientists found that the atomic mass of many atoms was found to be double or more than double the mass of total number of protons (as the mass of electron was so small that it was assumed to be negligible), so by the discovery of neutron led to the solution of this problem. For e.g. the mass of Carbon12 atom is 12 u but the no. of protons were 6 so it becomes 6u.